Picturing mobility: Transition probability color plots

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Income mobility

- Analysis of change over time in individual income and of the distribution thereof (see, e.g., Changing Fortunes by Jenkins (2011))

- Classic summary: the transition matrix
  - incomes at two points in time
  - partition population (or sample) into income groups –most often by quantile groups– at both periods
  - report probabilities $p_{ij}$ of transition to group $j$ conditional on starting in group $i$ ($\sum_j p_{ij} = 1$)
## Transition matrices

### Quintile groups:

<table>
<thead>
<tr>
<th>Origin</th>
<th>Destination</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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</tbody>
</table>

Misses details and/or difficult to read and compare

### Decile groups:

<table>
<thead>
<tr>
<th>Origin</th>
<th>Destination</th>
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<th>2</th>
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</table>
The transition matrix pictured...

A visual representation of the transition matrix: the *Transition probability color plot*

Each block is a (small) fraction of population/sample, arranged so that:

- Low income groups at top to high income groups at bottom *(origin)*
- Low income groups in blue to high income groups in red *(destination)*
Benchmarks

Benchmark pictures: status quo (immobility), reversal (total mobility), independence
Reverse estimates

Alternative representation: Arrange from top to bottom according to destination income group and color according to origin income group:
Stata command: transcolorplot

The command `transcolorplot` will be available from the SSC archive

**Syntax**

```
transcolorplot varname1 varname2 [if] [in] [weight]
[, nquantiles(#) nbins(#) ncolors(#) reverse ... ]
```

where ‘...’ are various options for (i) saving plot coordinates, (ii) for color rendition and (iii) miscellaneous additional graphical options
Implementation: Sitting on a giant’s shoulders

transcolorplot sits on a giant’s shoulders: the user-written commands spmap and spgrid by Maurizio Pisati (both available on SSC, see Pisati (Stata Journal, 2004)).

transcolorplot does relatively little:

1. arranges data into \text{nquantiles} \times \text{nbins} cells and evaluates cell ‘value’ (according to origin and destination incomes)
2. calls spgrid to generate a two-dimensional grid (the ‘chessboard’)
3. calls spmap to colorize the chessboard according to cell values computed at step 1 and draw the picture

All drawing options are passed to spmap: control for color palette, labels and titles, added text, overlaid labels and points, etc.
Example 1: Individual income mobility in USA and Germany

- Panel Study on Income Dynamics (USA) and German Socio-economic Panel survey (Western Germany)

- Data extracted from the Cross-National Equivalent data files – as used in Van Kerm (Economica, 2004)


- Approx. 6,000 observations in both countries (for balanced sample)

- After tax, total annual disposable household income adjusted for household size
Example 1: Individual mobility in USA and Germany
Some possible variations...
More detailed color palette

Western Germany
1985–1997

United States
1985–1997

More informative?
Some possible variations...

Finer grid

Western Germany
1985–1997

United States
1985–1997

More informative?
Some possible variations...
Less details!

Western Germany
1985–1997

United States
1985–1997

Notice rounding issues!
Some possible variations...

Alternative palettes

Western Germany
1985–1997

United States
1985–1997

Color palettes provided by spmap
(default is ‘rainbow’, here ‘blues’)
Example 2: International mobility in GDP per capita over 50 years

- Data from the Penn World Tables
- GDP per capita adjusted to common prices with purchasing power parities
- 100 countries with complete data from 1960–2009 (as used in O’Neill & Van Kerm (Manchester School, 2008))
Mobility in GDP per capita over 50 years

1960–2009

- 10 × 10 grid: each cell is just one country
- ‘reverse’ plot: countries ordered from top to bottom by destination (2009) GDP with color based on origin (1960) GDP
Mobility in GDP per capita over 50 years
How did we get there? Some animated plots...

1960–1960

(Clink on ‘play’ button to run!)
Mobility in GDP per capita over 50 years

1970–1970

1990–1990

(click on ‘play’ button to run!)
This work is part of the PersiPov project supported by the Luxembourg ‘Fonds National de la Recherche’ (contract C10/LM/783502).